Fast Forward in the Cybereconomy:

A Primer on Canada in the Information Economy

This report is based on a more comprehensive report prepared by the MEPA Branch in consultation with the SITT Sector of Industry Canada, entitled *Fast Forward in the Cybereconomy: Does Canada Stack Up?*

Canada in the Global Cybereconomy

102-05286/

Canada's success in the years ahead will depend on how well we embrace fast-changing information and communication technologies, and the cybereconomy generally.

Indeed, how well Canada measures-up vis-à-vis other countries, particularly the G-7, in terms of the growth and vitality of our ICT industries and the use of ICTs, will greatly determine our future competitive position.

But ICTs are fast-evolving, and challenges abound, as electronic commerce expands and the very building blocks of the information highway rapidly converge — in terms of content, delivery, computing and communication equipment.

How well we respond to these challenges will set our course to prosperity — not only into the 21st century, but beyond.

The Rapidly Growing Cybereconomy

ICTs are growing fast, globally...

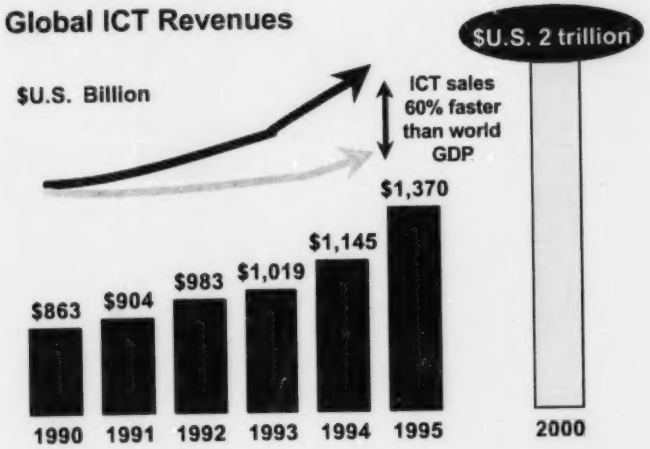
The cybereconomy is global — fuelled by the growth of Information and communication technologies (ICTs), and driven by the burgeoning needs of an information conscious age!

In 1995, worldwide ICT sales were close to $U.S. 1.4 trillion — over 5% of world GDP:

- Between 1990 and 1995, ICT revenues increased 60% faster than world GDP.

The outlook for ICT business is excellent:

- ICT sales should top $U.S. 2 trillion by the end of the century.



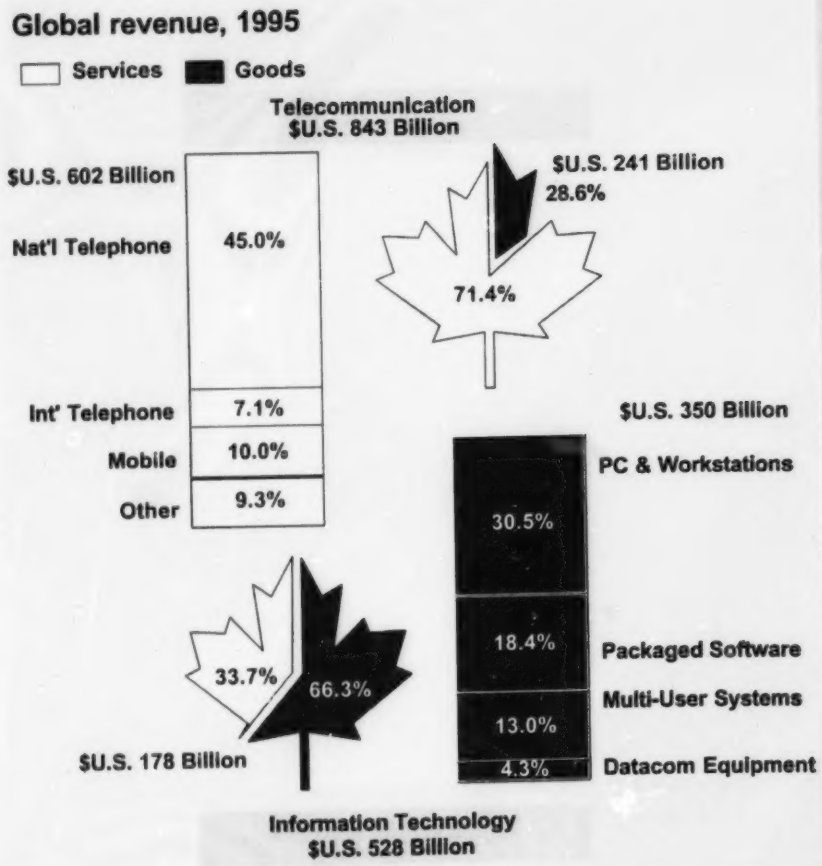
Source: Industry Canada estimates based on World Telecommunication Development Report 1996/97 and OECD Information Technology Outlook, 1997.

Worldwide ICT sales are close to one-and-a-half trillion dollars

...in both goods and services

In 1995, telecommunications made up $U.S. 843 billion in ICT sales while information technologies comprised $U.S. 528 billion in ICT sales.

- Within telecom, services sales were about two-and-a-half times that for goods.
- On the other hand, about twice as much of the information industry revenues were derived from goods — i.e. hardware and packaged software — than from services.



Source: International Telecommunication Union and OECD Secretariat (compiled from International Data Corporation).

Services are the dominant segment of the telecom market, while revenues from goods eclipse that of services in information technology.

ICT goods account for over a tenth of international merchandise trade

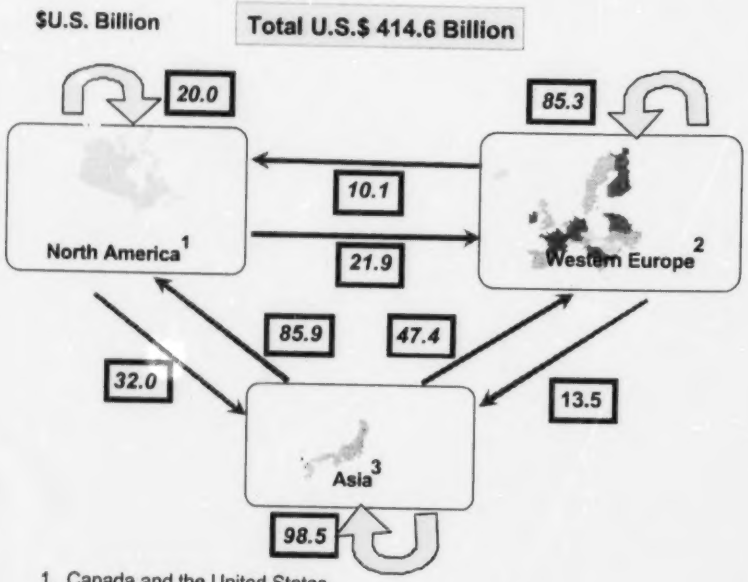
In 1994, over $U.S. 470 billion worth of ICT goods were traded worldwide — $U.S. 414.6 billion between North America, Western Europe and Asia.

- **North America is a net exporter to Western Europe, but a net importer vis-à-vis Asia.**

Data on global ICT services are not available. But the WTO estimates they could be as high as $U.S. 500 billion.

90% of all merchandise trade in ICT goods takes place between North America, Western Europe and Asia.

Trade in office machines and telecom equipment, 1994



1. Canada and the United States.
2. EU and EFTA.
3. Japan and the Dynamic Asian Economies (Hong Kong, Taiwan, Malaysia, Singapore, South Korea and Thailand)

Trade in office machines and telecommunication equipment includes commodities classified broadly under SITC (rev. 2) groups 75, 76, and 776.

Source: OECD Information Technology Outlook 1997, based on OECD Secretariat calculations from WTO.

Technological developments have sparked tremendous price declines...

Growth in ICTs has been spurred by rapid technological advances that include landmark developments in computer processing power — these have contributed to lower prices, and the introduction of new and innovative, products and services.

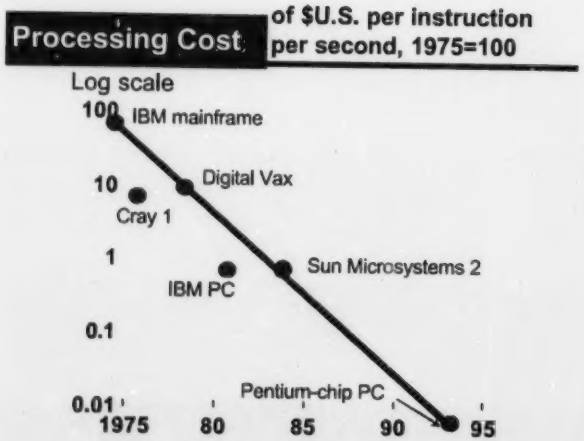
- **The processing cost per instruction per second has fallen from $U.S. 100 in 1975 to one penny in 1995.**

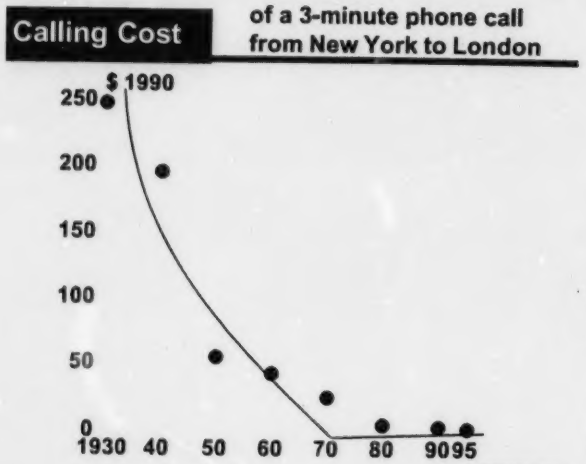
- **Also, new technologies in voice and data communications (e.g. fibre optics) have contributed to the decline in transmission costs.**

"If cars had developed at the same pace as microprocessors over the past two decades, a typical car would now cost less then $5 and do 250,000 miles to the gallon."

***The Economist*, September 28th, 1996**

Communication and information processing costs are in free fall





Source: The Economist, September 28, 1996.

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...resulting in faster and cheaper exchange of information...

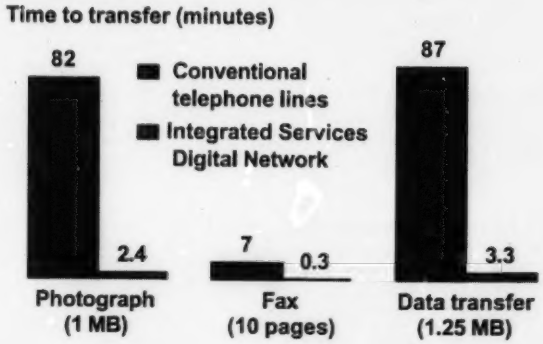
Integrated Services Digital Network lines provide quicker transmission rates, and faster call setup and termination, than conventional lines — along with more reliable connections.

The fastest way to send information is also the cheapest. Sending information as e-mail via the Internet costs a fraction (one-third of one percent) of the cost of faxing or overnight delivery:

- And unlike faxing or overnight delivery, there is practically no increased cost to sending the same information to more than one recipient.

The costs of obtaining information are no longer the barrier they once were to acquiring knowledge.

Transfer Time using different technology



Source: World Telecommunication Development Report 1995, ITU.

Sending Cost of a 42 page document, New York to Tokyo

Source: WorldCom 1996 Annual Report.

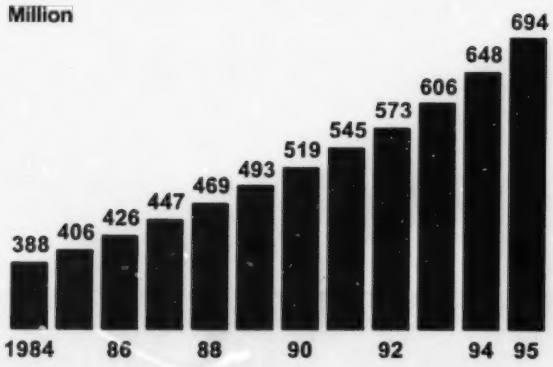
...and rapid growth of global networks for voice...

Globally, almost 300 million mainlines were added to the telecommunication networks in the last decade.

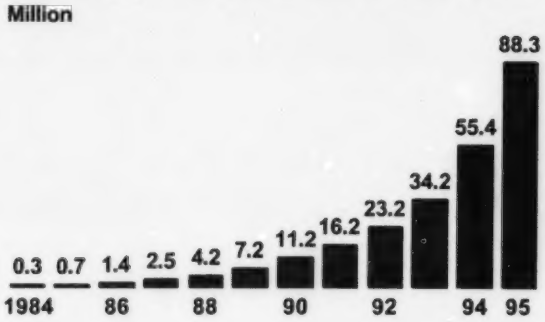
Cellular subscription has accelerated, benefiting from the switch from analogue to digital systems which has reduced capacity constraints.

Cellular has enjoyed over 60% annual growth in subscribers over the last decade.

Main telephone lines
Installed base worldwide



Cellular mobile subscribers worldwide



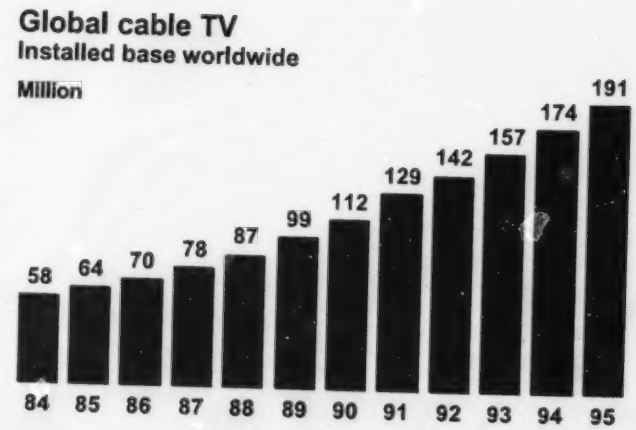
Source: World Telecommunication Development Report 1995 and 1996/97.

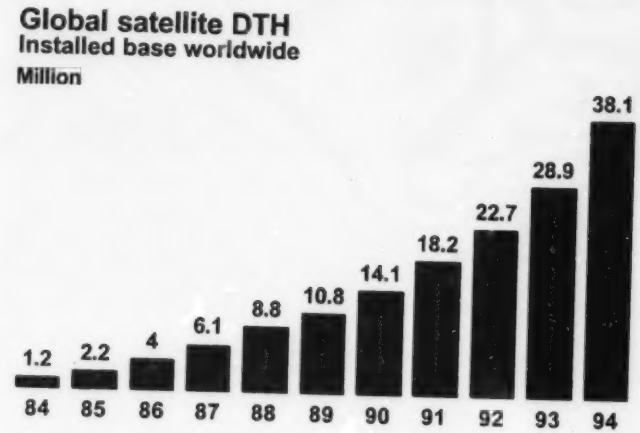
...and audio-visuals

In the last decade, cable TV subscribers worldwide grew at an average annual rate of 12%.

Growth of Direct-To-Home satellite subscribers rose, on average, 33% per year.

In the future, inter-modal competition (e.g., wire vs wireless, cable vs satellites) between networks will intensify.





Source: World Telecommunication Development Report 1995 and 1996/97.

As well, Internet use is rising rapidly...

The Internet has been almost doubling in use every year.

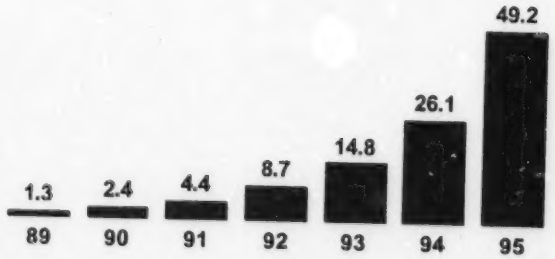
- The number of Internet hosts has grown by twelve times since 1993, to over 16 million in 1997.

It is quickly evolving into a multi-media platform for numerous key activities — including data communications, real-time computer conferencing, audio broadcasting, transferring images and video-clips, and real-time voice telephony.

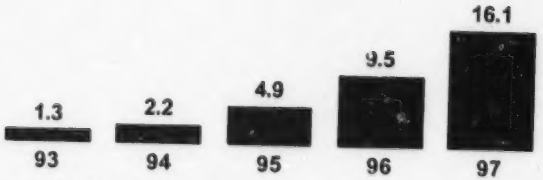
"Just as the PC revolution was the result of low-cost, powerful processors, the Internet revolution is the result of cheap, ubiquitous communications.... The Internet is pervasive in everything we are doing."

Bill Gates, Chairman & CEO, Microsoft
December 1995

Number of Internet users worldwide
Million



Number of Internet hosts worldwide*
Million



* As of January of each year.

Source: Network Wizards.

...by professionals and non-professionals alike...

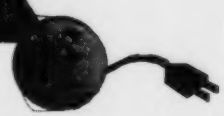
A number of surveys suggest that most Internet users are professionals and/or managers. However, the Internet is becoming more mainstream: the proportion of professionals/managers using the Internet declined from 50% in 1995 to 42% in 1997.

- In 1997, 23% of users were students and 19% were technical workers.

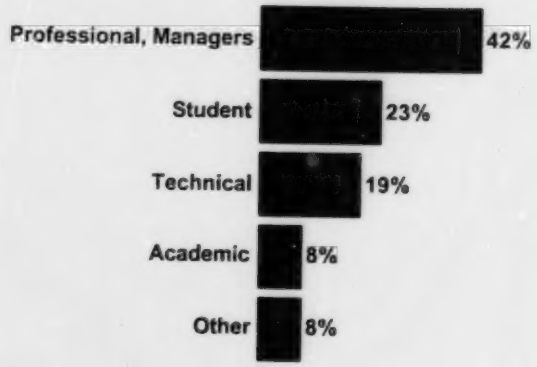
The U.S. has by far the largest number of Internet users.

- Canada, despite a much smaller population, slightly trails Germany and the U.K. and leads Japan in total Internet users.

More and more people are turning to the Internet.

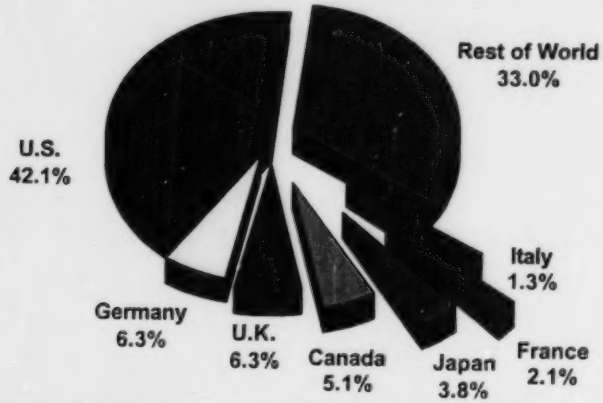


Internet users by profession, 1997



Source: Yahoo/Jupitor.

Distribution of estimated Internet users, 1995



Source: World Telecommunication Development Report 1996/97.

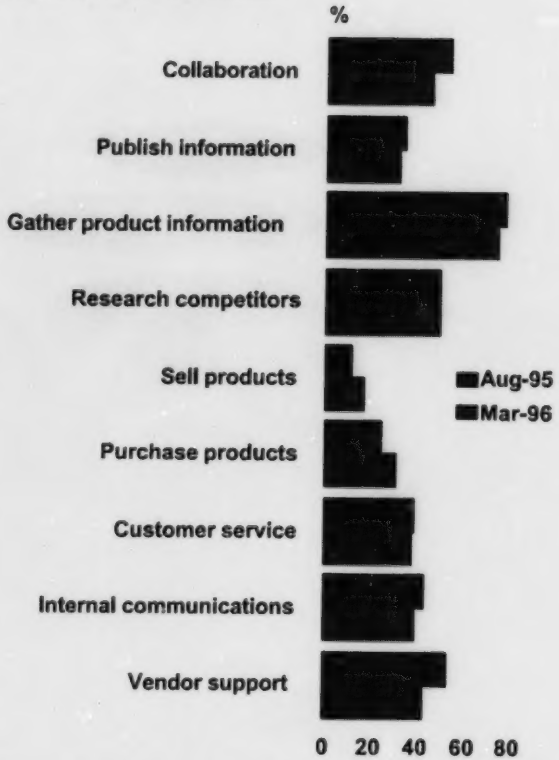
...for gathering information, but for other uses as well

A large survey of Canadian and American Internet users indicated that over 70% of the respondents use the Internet to gather product information.

However, buying/selling of products is gaining ground.

The need for information has been instrumental to the rising use of the Internet.

Business use of the Internet: Canada and the U.S.



Source: Based on a survey by CommerceNet/Nielsen Media Research.

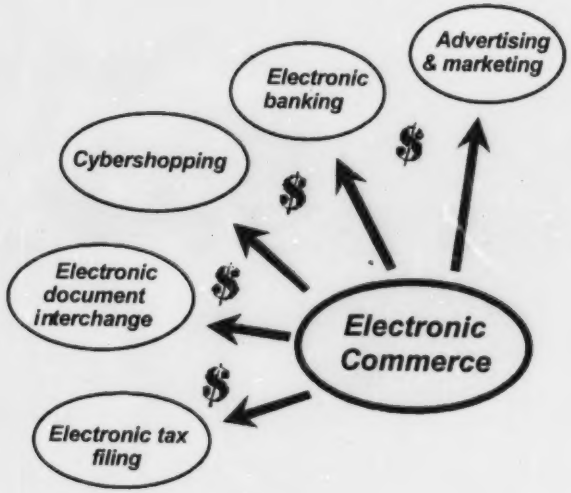
The Internet and ICTs generally are revolutionizing business...

ICTs are expected to permeate and touch every facet of economic activity — through <u>electronic commerce</u>.

- Direct electronic commerce will permit on-line ordering, payment and delivery of intangible goods and services such as computer software, entertainment content and information services on a global scale.

- Indirect electronic commerce will see the electronic ordering of goods, which still must be physically delivered using traditional channels (postal services, courier).

- Other innovative forms of electronic commerce will take place involving a combination of on-line/off-line delivery and payment.



Electronic commerce is penetrating the business mainstream and revolutionizing how the world conducts business

...benefiting business and consumers

Electronic commerce lowers transactions costs, makes international firms more easily accessible, improves levels of pre- and post-sales support and increases product information.

In a recent survey, Canadian firms who had implemented electronic commerce technology and found that it had a positive effect on customer service outnumbered those who found negative effects by 10 to 1.

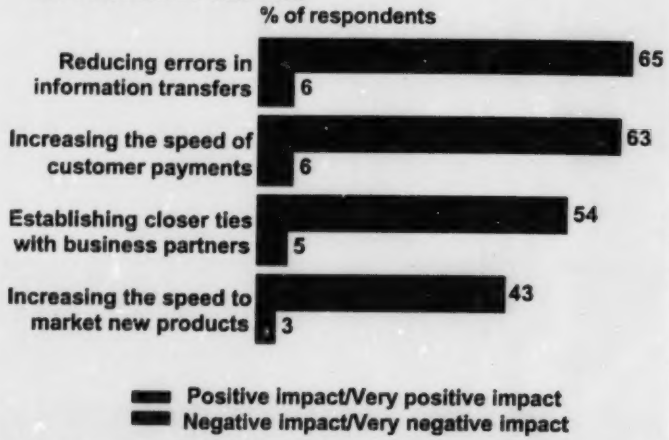
- **Reduced errors in information transfers and increased speed of customer payments were cited as benefits by two-thirds of the respondents.**

Electronic commerce allows faster and better ways of doing business.

Supplier Opportunity	Customer Benefit
Global presence	Global choice
Improved competitiveness	Quality of service
Mass customization & "customerization"	Personalized products & services
Shortened or eradicated supply chains	Rapid response to needs
Substantial cost savings	Substantial price reductions
Novel business opportunities	New products & services

Source: Esprit.

Impact of electronic commerce on customer service*



*Based on Industry Canada survey of technology diffusion in 3000 establishments across 8 service industries.
Source: Industry Canada, "Survey of Technology Diffusion in Service Industries.", 1996.

Internet sales could reach phenomenal levels...

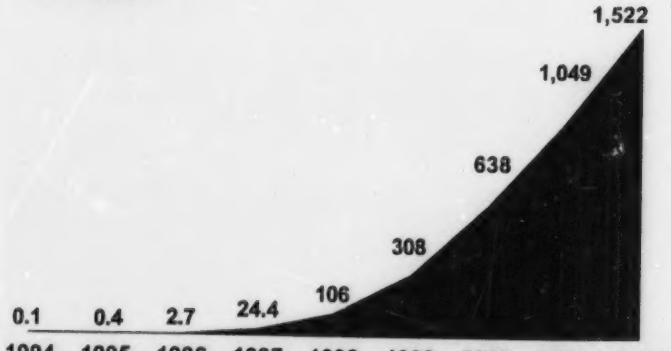
Estimates vary about the value of commerce which will be generated over the Internet, but according to one source, Web-generated revenues could exceed $U.S. 24 billion in 1997, and swell to over $U.S. 1 trillion by the year 2001.

Business-to-business Internet commerce is already substantial and ready to explode:

- **U.S. Internet sales are forecast to rise by 1000% in 1997, to $U.S. 8 billion — and to $U.S. 330 billion by 2002.**
- **Durable manufacturers will account for 38% of sales in 1997, but wholesalers and retailers are expected to rack up over one-half of sales in 2002.**
- **Phone and fax use will give way to the Internet — over 40% of business-to-business sales in the U.S. could come via Internet commerce by 2000, compared to 15% in 1997.**

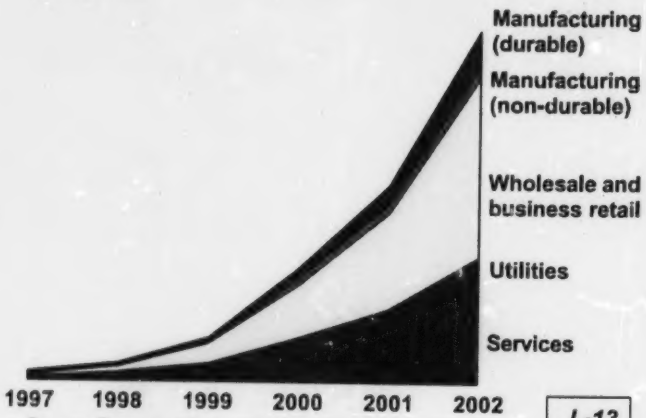
Web-generated revenues could hit $U.S. 1 trillion by 2001.

Global World Wide Web-generated revenue projections
1994-2002
$U.S. Billion



Source: ActiveMedia Incorporated.

US Internet commerce revenue projections
$U.S. Billion



Source: Forrester Research, Inc. (July 1997)

...as could on-line service sales

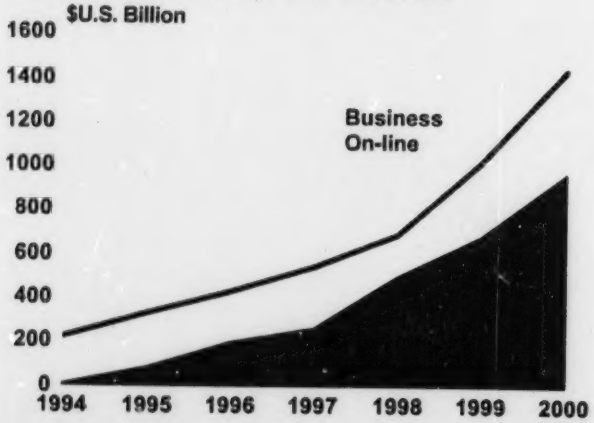
Commercial on-line networks actually generate substantially more revenues than Internet.

- On-line revenues from business and consumer transactions are projected to exceed $U.S. 2 trillion by 2000, more than three times the level in 1996.

In 1995, there were a total of 21 million on-line subscribers worldwide, or just over two-fifths of the estimated number of Internet users worldwide.

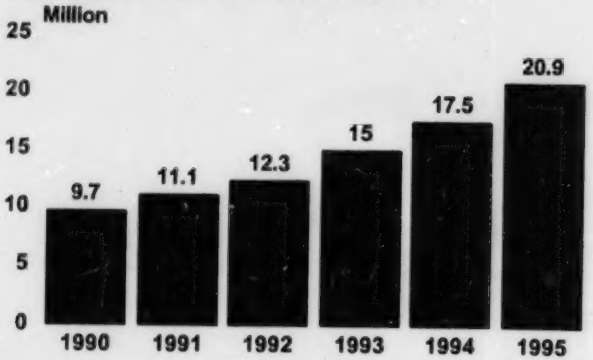
Many on-line providers are integrating Internet access into their services to better compete with Internet service providers.

Electronic transactions revenue



Source: Simba Information.

Worldwide on-line subscribers*



* Subscribers to proprietary on-line and videotex services. Figures exclude the Internet users.

Source: World Telecommunication Development Report 1996/97.

Electronic banking has made its mark...

Canadians are leading users of electronic banking.

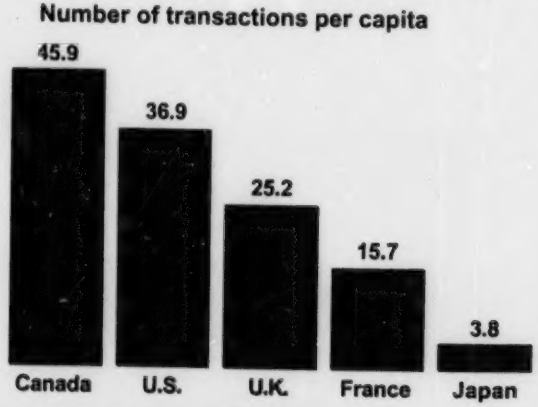
Canadians have more credit and debit cards combined per capita than do the residents of any other country.

Between 1987 and 1995, the value of Interac transactions in Canada rose twenty-fold to $21 billion.

Some predict that by the year 2005, about 20% of consumer purchases will be made electronically.

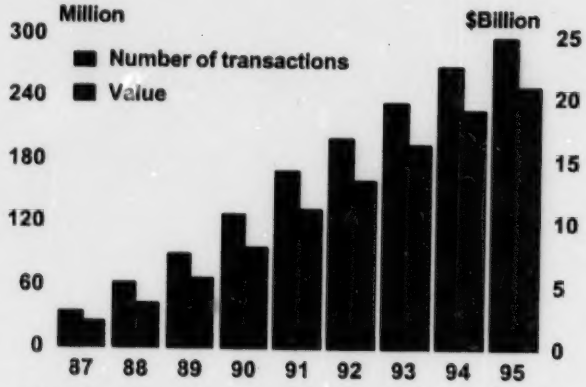
Canada tops many major industrialized countries in the use of automatic banking machines.

Use of automated banking machines in 1995



* Source: Interac, Annual Review 1996.

Interac transactions in Canada*



* As at December 31 for each given year.

Source: Canadian Bankers Association.

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...but Internet banking is also accelerating

Corporate banks are poised for dramatic expansion on the Internet.

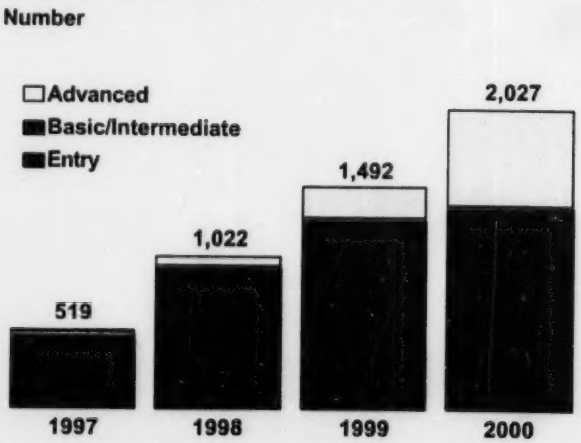
- **At present there are 519 corporate Internet banking (CIB) Websites globally. At present, over 90% provide entry-level sites while 2% offer advanced transactional services, such as cash management, foreign exchange, and third party payments.**

- **Within three years, CIB sites worldwide are projected to quadruple to over 2000 — a third of which will be fully functioning corporate Internet banks offering advanced services.**

North America and Europe account for almost 80% of the current banking sites. All of the advanced sites are in the U.S., Canada and Australia.

The creation of open standards for Web financial applications, and the emergence of stronger cryptography for addressing security and reliability concerns are major factors behind the expected growth in CIB.

Projected corporate Internet banking sites worldwide
number and functionality



Corporate Internet banking sites worldwide by region, 1997

Number of sites worldwide, 1997 : 519

Source: Adapted from Booz-Allen Hamilton Corporate Internet Banking Survey, April 1997.

"Cyber-Suppliers" —
ICTs and the ICT Sector in Canada

Canada's ICT sector has been growing with zest

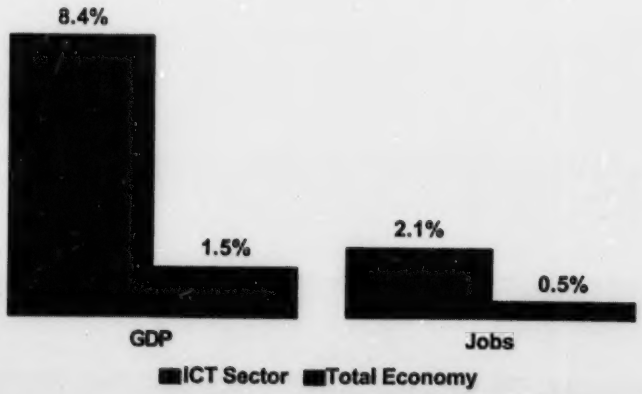
The ICT sector 'supplies' the means by which the information and technology needs are met in a growing cybereconomy.

Canada's ICT sector has been a stellar performer.

- Real output of the ICT sector increased by nearly 50% between 1990 and 1995 — this is more than six times the rate of growth of the overall economy.

- Similarly, employment in the ICT industries increased by more than 50,000 — this is nearly six times the rate of overall job creation in the entire economy.

1990-1995 growth rates in Canada



Source: Industry Canada and Statistics Canada (see Annex for industry classification of the ICT sector).

In terms of both jobs and growth, Canada's ICT sector has been pace-setting

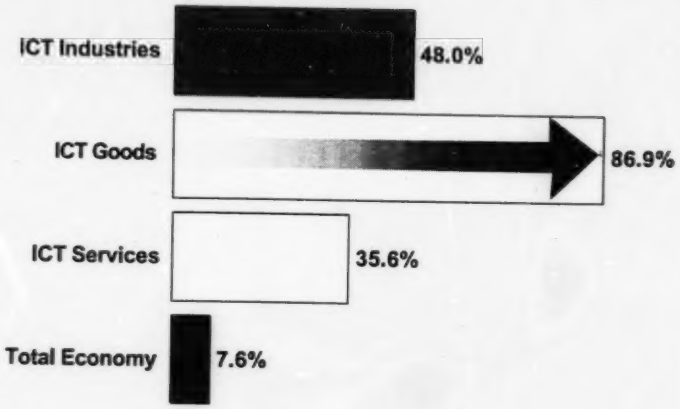
The ICT goods' sector has been most impressive...

The output performance of the ICT goods industries has been particularly outstanding. In the midst of recession and restructuring during the early 1990s, the ICT goods sector in Canada has nearly doubled — accounting for 30% of total ICT GDP in 1995, and for almost 2% of the economy's GDP.

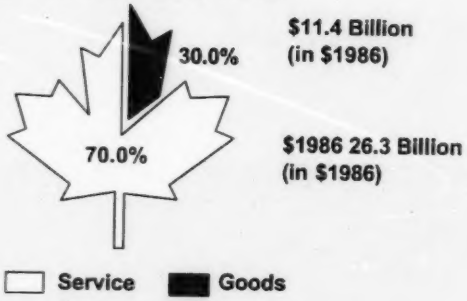
Between 1990 and 1995, the ICT services sector's real GDP grew by over 35%, almost five times faster than the overall economy. In 1995, it contributed to 5% of Canada's GDP.

The share of ICT goods in Canada's GDP nearly doubled between 1990-95.

Real GDP growth, 1990-95



Share of ICT GDP, 1995



Source: Industry Canada and Statistics Canada.

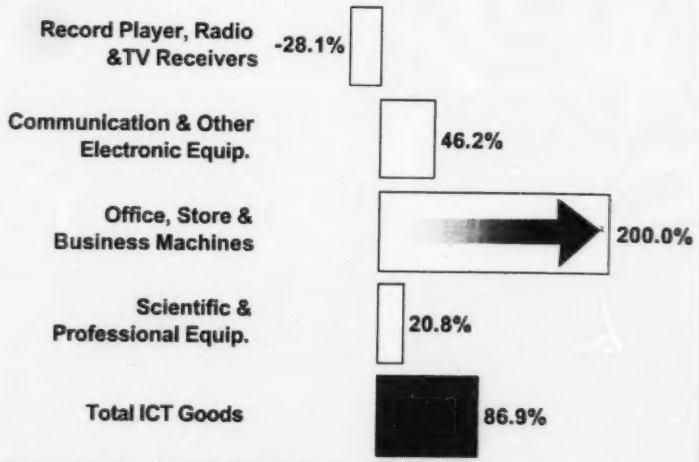
...led by fast output growth in computers...

Leading the growth of the ICT goods sector was the office, store & business machines industry (including computing equipment).

- **Its output grew 200 percent between 1990 and 1995, becoming the dominant sub-sector.**
- **The communication & other electronic equipment industries also increased significantly, growing by more than 45% between 1990 and 1995.**

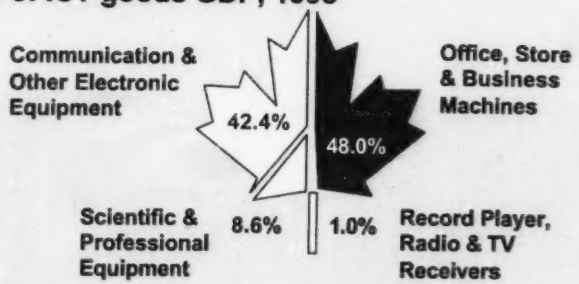
Computer output plus other office, store & business machine output grew by 200% between 1990-95.

Real GDP growth in ICT goods industries, 1990-95



Source: Industry Canada and Statistics Canada.

Share of ICT goods GDP, 1995



...but ICT services' have also shown splendid growth...

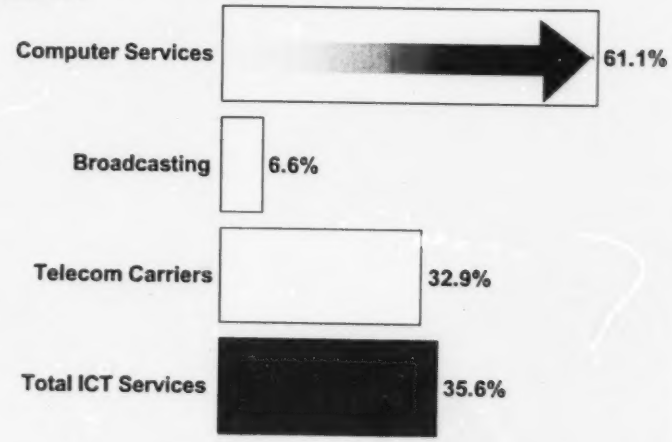
The importance of computer services is rapidly increasing.

- The software and computer services industry's GDP increased by over 60% between 1990 and 1995 to $US 6 billion.

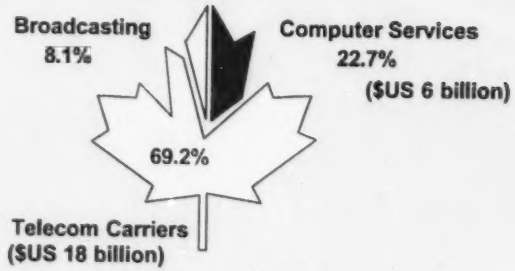
- Telecom carriers' output rose by one-third, to $US 18 billion.

The importance of computer services is increasing.

Real GDP growth in ICT services industries, 1990-95



Share of ICT services GDP, 1995



Source: Industry Canada and Statistics Canada.

...and ICT services' jobs have been quite robust

During the 1990s, the number of jobs in the ICT sector grew by 15% to 415,000.

- The job picture in ICT services was particularly bright, with employment rising by nearly 20%and the number of jobs growing by 50,000.

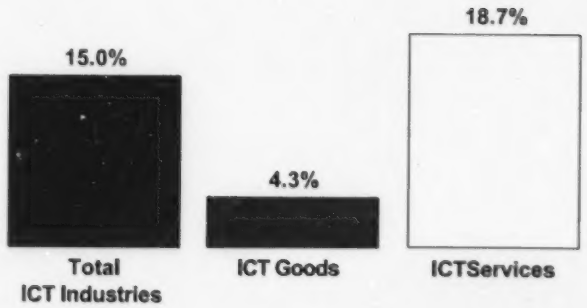
- In contrast, employment levels in the ICT goods industries rose by only 4% (resulting in an additional 4,000 new jobs).

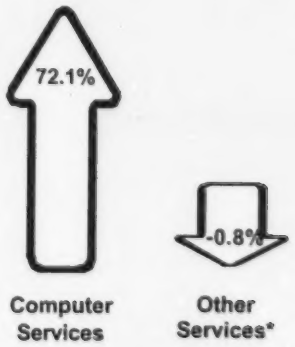
Software and computer services were the main driving engines behind the service ICT's job creation. They grew by over 70% between 1990 and 1995, and now employ over 120,000 persons.

- Telecom equipment jobs rose by nearly 50%.

Between 1990 and 1995, about 54,000 ICT jobs have been created, mainly in computer services.

ICT industries' employment growth, 1990-95





* Broadcasting and telecom carriers
Source: Industry Canada and Statistics Canada.

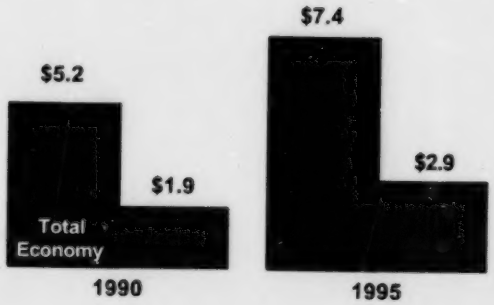
R&D spending is particularly high in the ICT sector...

The ICT sector accounts for nearly 40% of industrial R&D spending in Canada, 60% of which is in communication equipment:

- **R&D expenditure in the ICT sector increased by almost 50% during the first half of the 1990s.**

The ICT sector contributes a major and rising share of total R&D spending in Canada.

R&D in $ Billion



Source: Industry Canada and Statistics Canada
(see Annex for industry classification of the ICT sector).

...which helps explain why their productivity has leaped ahead

Labour productivity in ICT sector grew by 5.2% per annum during 1990-95 period — this compares to 1% annual growth for the Canadian economy.

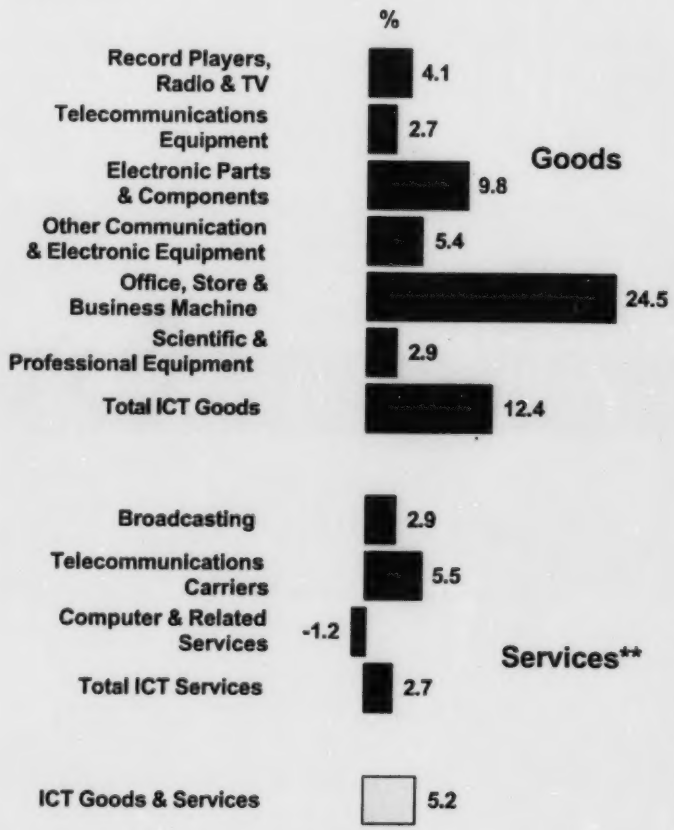
Meantime, labour productivity of ICT goods industries was increasing at a phenomenal annual rate of 12.4%.

- Rapid technological progress and increased capital intensity — especially in computer hardware, electronic parts and components, and electronic equipment — have contributed to the productivity gains.

Labour productivity growth in telecom services strongly out-performed other services industries.

Rapid productivity improvements in ICT industries have resulted in lower prices, higher quality products, improved service and increased choice for consumers.

Average annual growth of labour productivity*
1990-1995



* Real GDP per person employed
** Excludes other telecom (e.g. paging)
Source: Industry Canada and Statistics Canada.

M-7

Foreign-owned firms are dominant players in ICT goods...

Foreign-owned firms account for more than 50% of economic activity in all ICT goods industries except electronic parts and components and telecom equipment).

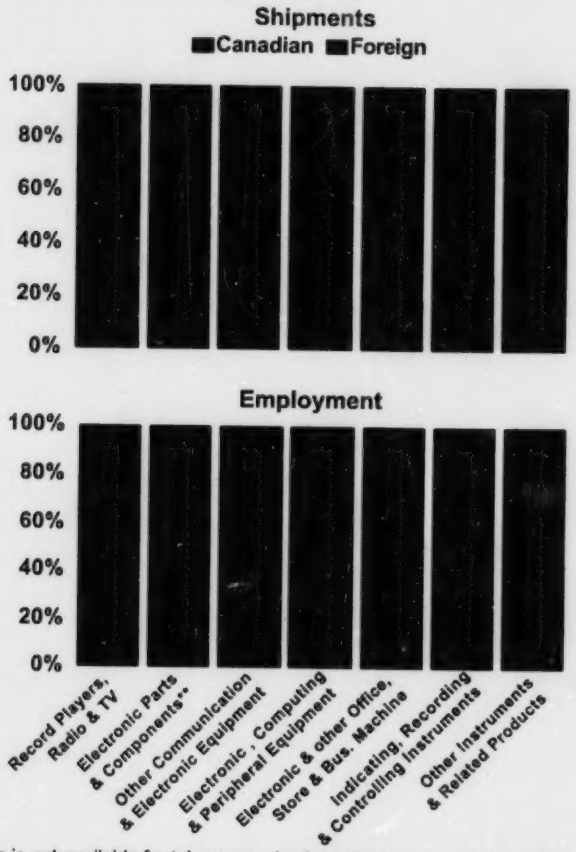
Most ICT establishments (between 70% to 90%) are Canadian-owned, but they are typically much smaller in size.

Foreign-owned companies such as IBM Canada, Digital Equipment Canada, Hewlett-Packard Canada and Xerox Canada are the major information technology producers.

There are major Canadian-owned firms such as Northern Telecom, Corel Corporation and Newbridge Networks Corporation involved in communications equipment and software manufacturing.

In ICT goods industries, foreign-owned establishments account for between 60% to 70% of shipments, value added and employment.

ICT goods' shipments and employment by ownership types*, 1991



* Data is not available for telecommunications equipment and other office, store, and business machines

** 1990 data

M-8

Source: Statistics Canada and Industry Canada, Business Integrated Database.

...and contribute to the high trade orientation of ICT goods industries

The dominant presence of foreign multinational subsidiaries and the large amount of intra-firm trade help explain the large two-way trade flows in the ICT industries.

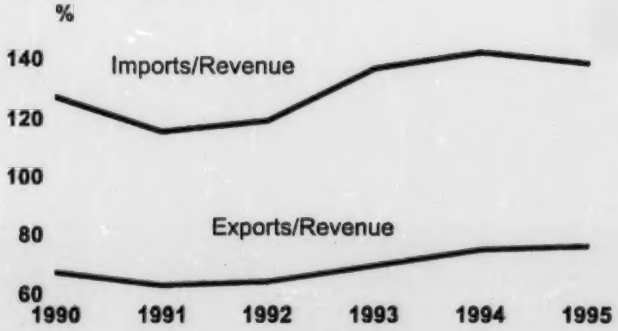
The export orientation of ICT goods industries rose from 67% in 1990 to 76% in 1995 — which is substantially higher than Canada's overall exports/GDP ratio of about 40%.

But the import propensity of ICT goods industries is higher — over 120%. This is resulting in a large and growing trade deficit in ICT goods.

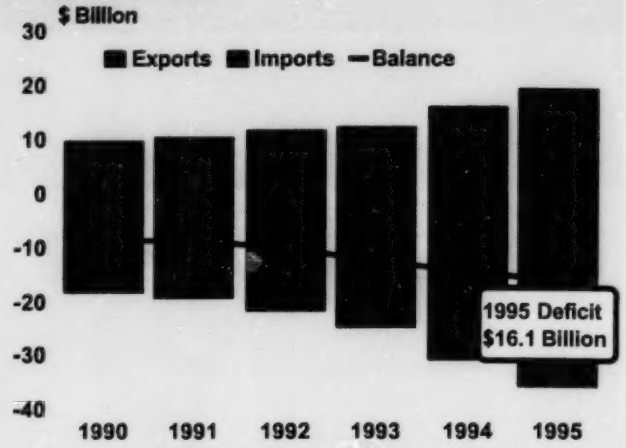
The trade orientation (exports plus imports) of ICT service industries is relatively small (less than 15% of the total revenue).

Semi-conductors account for nearly 70% of ICT goods imports.

ICT goods trade orientation



ICT goods trade



Source: Industry Canada and Statistics Canada.

Computers dominate ICT goods exports...

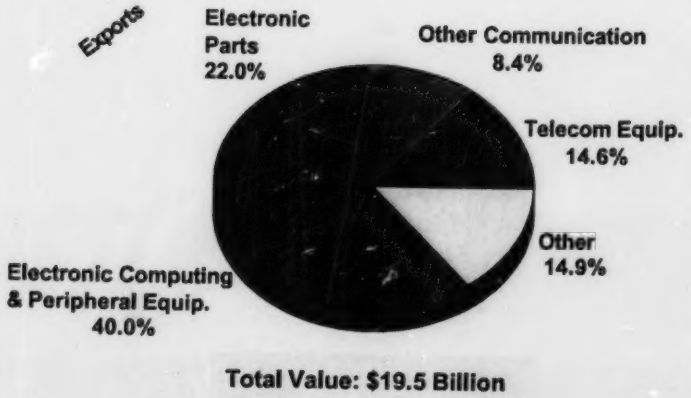
The share of computer hardware and telecom equipment in total Canadian ICT goods exports increased from under 45% in 1990 to 55% in 1995.

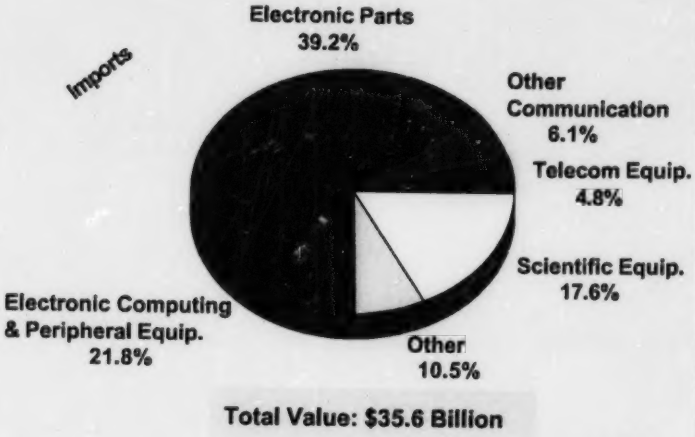
In sharp contrast, the share of electronic parts in ICT imports increased by 13 percentage points, to over 39% in 1995.

These trends imply increased intra-industry trade and product specialization.

Computer hardware and telecom equipment exports have risen substantially.

1995 ICT goods trade





Source: Industry Canada and Statistics Canada.

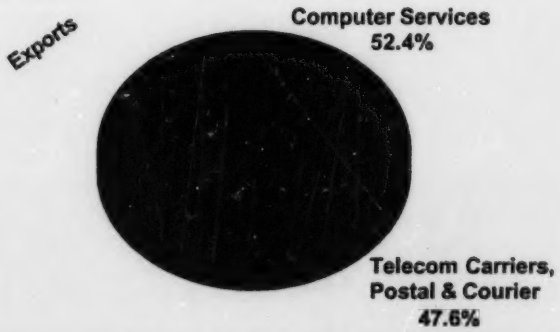
...while computer services comprise the lion's share of services trade

The share of computer services in ICT services exports more than doubled between 1990 and 1994, reaching 52.4%.

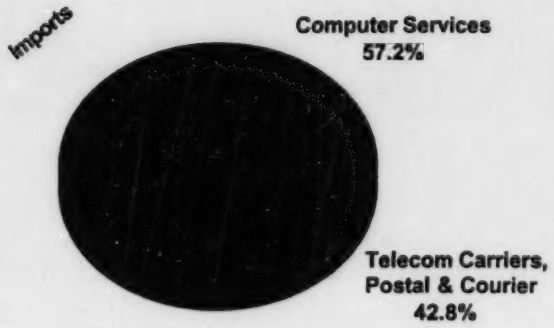
Their importance in ICT imports also increased but at a considerably slower pace (a 28% increase).

Computer services are becoming an increasingly important market item

1994 ICT services trade*



Total Value: $1.5 Billion



Total Value: $1.8 Billion

M-11

* excludes broadcasting
Source: Industry Canada and Statistics Canada.

Who is Benefiting?

"Cyber-Consumers" in Canada

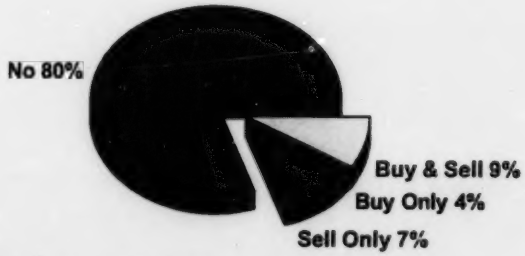
In Canada, the cybereconomy is making its presence...

Who is using and benefiting from new ICTs and the cybereconomy in Canada?

"Information/technology consumers" of Canada's cybereconomy includes businesses, households, professionals, students...all are beginning to embrace the benefits of the cybereconomy.

For instance, some 20% of more than 400 Canadian companies polled recently were found to have initiated some form of Internet-related commerce.

Do Canadian firms* buy and sell using the Internet?



* Telephone survey of 400+ Canadian business executives
Source: A.T. Kearney Executive Viewpoint by Compas, Spring 1997.

Businesses, households, professionals, and students are all beginning to embrace the cybereconomy.

...although business still faces some obstacles...

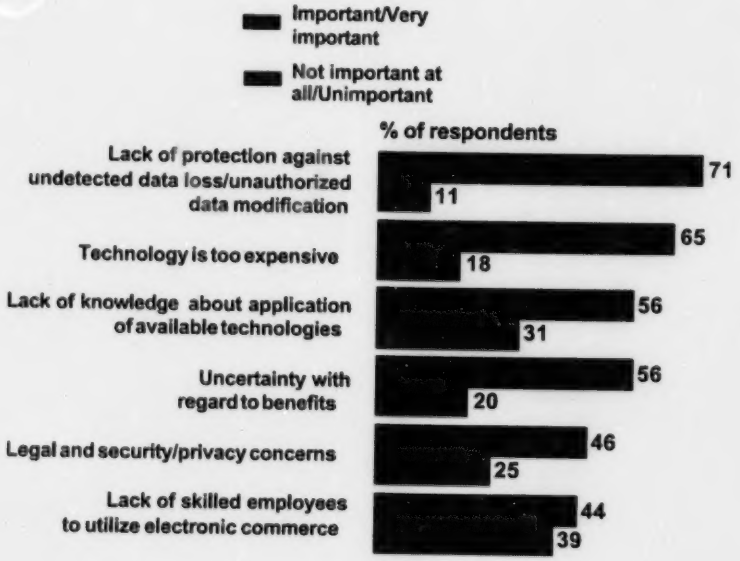
Surveys indicate that failure of Canadian businesses to utilize electronic commerce stems from economic, legal and technological concerns.

- **At least two-thirds of the respondents indicated that a lack of protection against data modification/loss was an important or very important impediment to implementing electronic commerce.**

- **A similar proportion of respondents reported that cost was a major barrier to the use of electronic commerce.**

A number of technological concerns are still holding back wider business use of electronic commerce.

Barriers to implementing electronic commerce in Canadian service industries*



*Based on Industry Canada survey of technology diffusion in 3000 establishments across 8 service industries.
Source: Industry Canada, "Survey of Technology Diffusion in Service Industries.", 1996.

...particularly smaller businesses

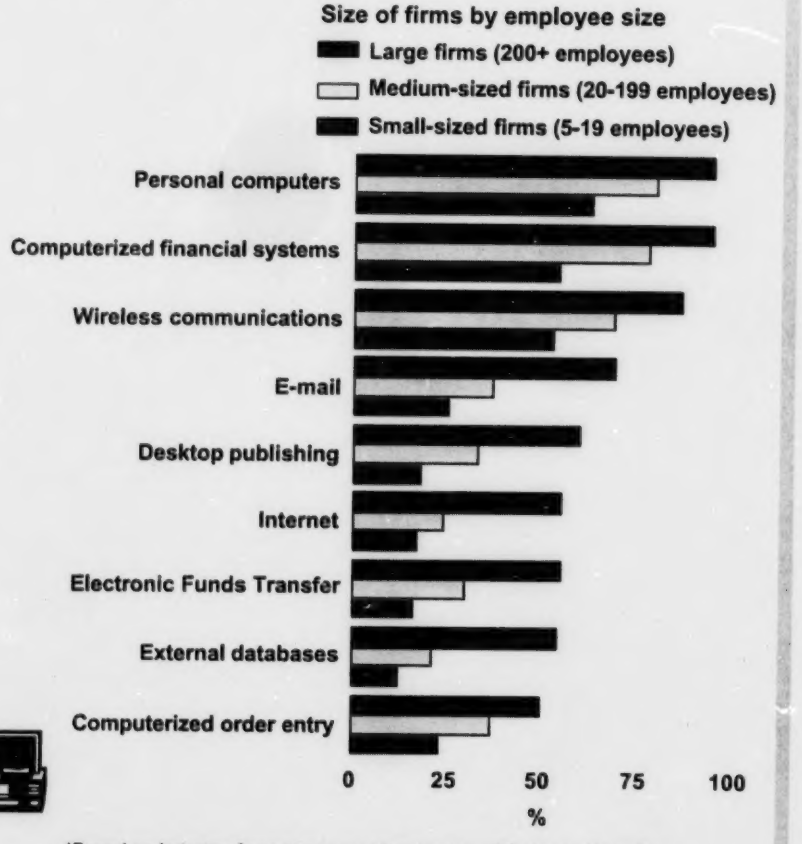
Information technologies appear to be strongly correlated with firm size:

- Over 70% or more of large and medium-sized Canadian service firms use PCs, computerized financial systems, and wireless communications.

- The difference in usage rates is lowest for technologies with broad applications (PCs).

Small-sized firms particularly lag in the use of cutting-edge technologies.

Use of selected ICTs in service industries in Canada, by firm size*



*Based on Industry Canada survey of technology diffusion in Canadian 3000 establishments across 8 service industries.
Source: Industry Canada, "Survey of Technology Diffusion in Service Industries.", 1996.

N-3

Some industries are higher ICT-users than others

Canadian industries are rising in their ICT-use.

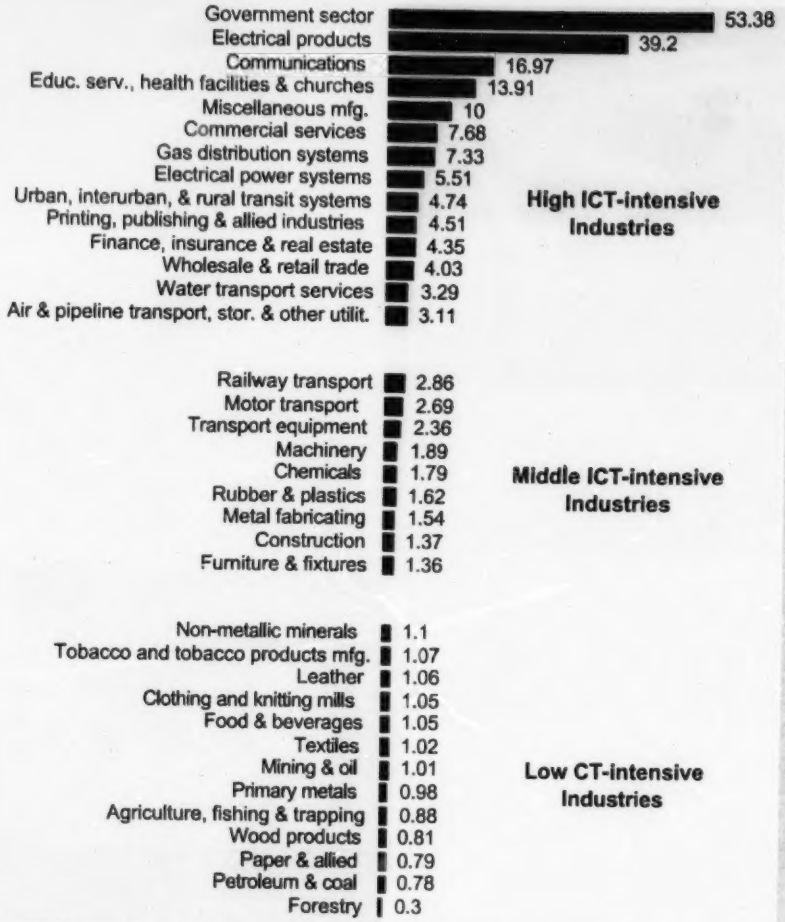
- **In Canada, ICT intensity almost doubled in six years, to 5.2% of all inputs or $48 billion in 1992.**

Six out of 11 services industries are presently classified as high ICT-users.

Conversely, 10 of the 18 manufacturing industries are ranked as low in ICT intensity, and in nine of them either declined or remained stable since 1992.

Many industries in Canada are already high users of ICTs.

ICT intensity* in Canadian industries, 1992



* ICT intensity is measured as the proportion of ICT goods and services purchased by a particular industry relative to the total goods and services purchased by the same industry.

Source: Conference Board of Canada, "Jobs in the Knowledge-Based Economy: Information Technology and the Impact on Employment.", 1996.

Households are also embracing the cybereconomy...

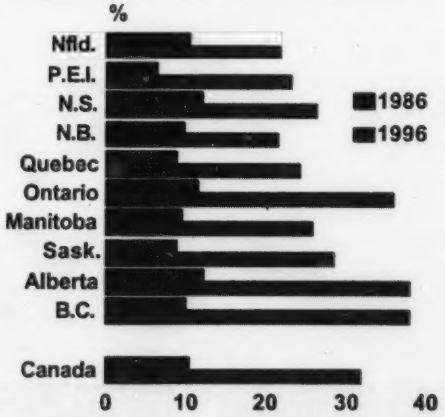
Canadian households with computers almost tripled in the last ten years.

Nearly half of all computer households have modems, and households with a modem have almost doubled between 1994 and 1996. A significant proportion of these households use their modems to access the Internet.

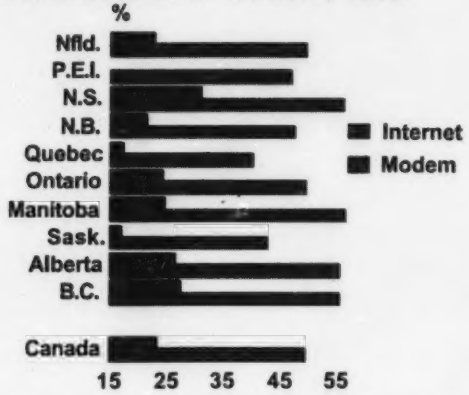
- Nova Scotia has the highest Internet penetration rate (three in ten computer households), followed closely by British Columbia and Alberta.

One-third of all households in Canada in 1996 had a computer.

% of households with computers



% of computer households with Internet access or modem, 1996



Source: Industry Canada and Statistics Canada.

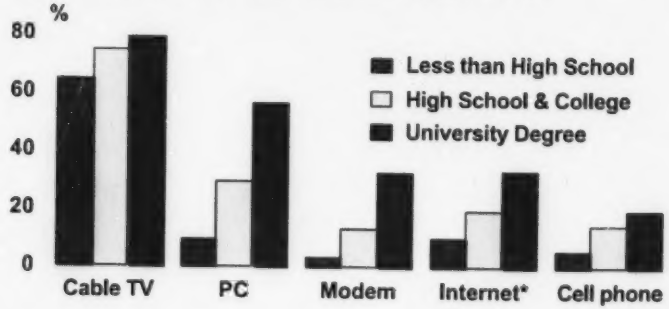
...especially educated and well-off households...

Household heads with university degrees make up less than one-fifth of all households, but account for one-third of all computer users — and almost one-half of all Internet users.

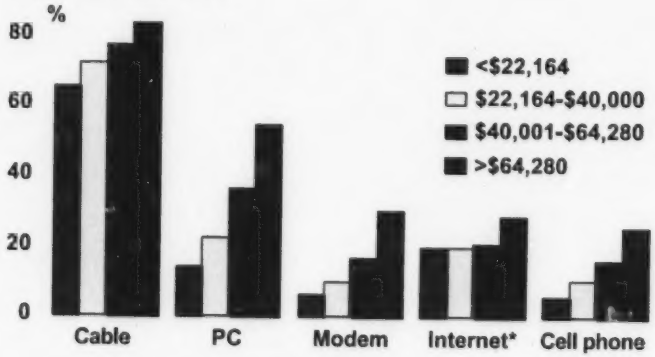
About 7 in 10 households using the cellular phone, computer, and the Internet are in the top half of income earners.

ICT-use reflects both income and education.

ICT penetration of homes in Canada by education of household head, 1996



ICT penetration of homes in Canada by income, 1996



* Penetration among PC owners.

Source: Industry Canada and Statistics Canada.

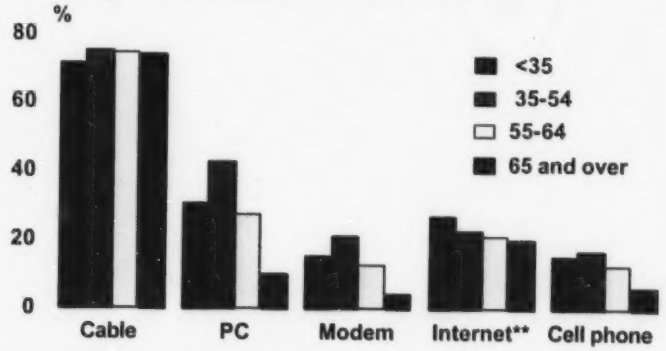
...and young households with children

ICT penetration rates are highest for the 35-54 age group — except for Internet, where household heads aged less than 35 have the highest Internet penetration rate. This suggests that young people are relatively more enthusiastic users of the Information Highway.

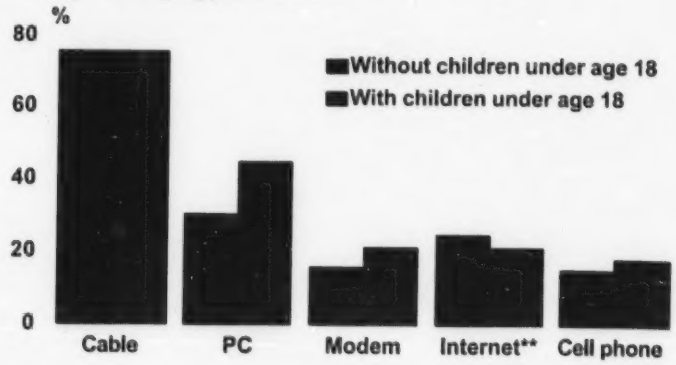
Almost 1 in 2 households with children under the age of 18 have computers, almost one-and-a-half times as many as those without children under age 18.

The presence of children under age 18 has a big impact on the computer penetration rate.

ICT penetration of homes in Canada by age of household head, 1996



ICT penetration of homes in Canada by family type*, 1996



* Single family excluding single persons and multi-family households.
** Penetration among PC owners.

Source: Industry Canada and Statistics Canada.

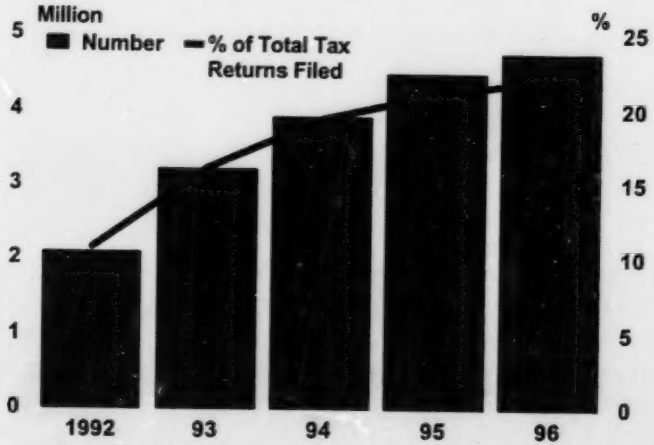
Filing taxes electronically is growing in popularity

Businesses are taking to electronic interaction in their dealings with government.

- **In 1996, over 4.7 million tax returns were filed electronically with Revenue Canada, more than double the number in 1992.**

The proportion of total tax returns filed electronically also doubled between 1992 and 1996, from 11% to 22%.

Tax returns filed electronically in Canada



Source: Revenue Canada.

Public access to the Internet is also picking-up

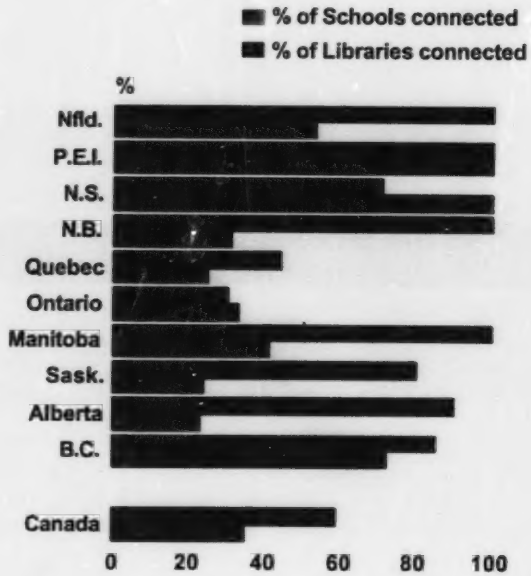
The joint federal/provincial SchoolNet program is facilitating the connectivity of Canada's schools and public libraries to the Internet.

In Canada, close to 9,500 schools (or 59% of the total) and 1,175 libraries (or 35%) are connected.

- **All schools in Manitoba, New Brunswick, P.E.I. and Newfoundland have Internet access.**
- **All libraries in P.E.I. and Nova Scotia are linked to the Internet.**

More and more schools and libraries are helping students and citizens hook-up to the Internet.

Internet access through schools and libraries June 1997



Source: SchoolNet, June 1997.

Who Else is Benefiting?

The Cybereconomy and Jobs

ICT-use benefits job growth

OECD studies clearly show the relationship between information technology investment and employment growth in services.

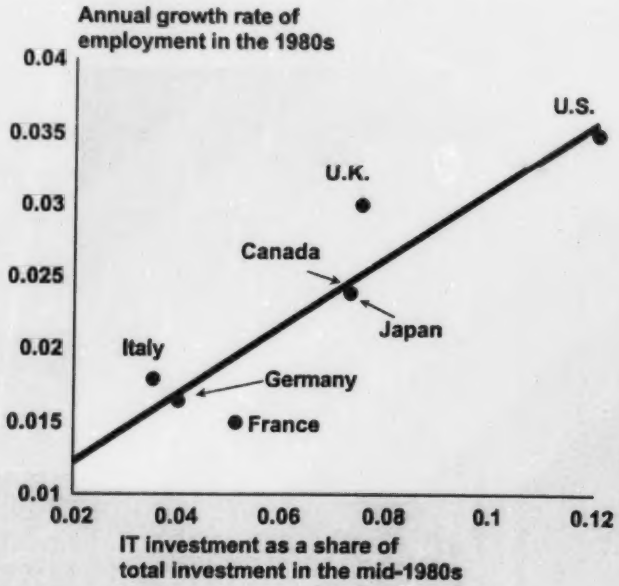
- Job gains associated with the use of new IT technologies in the G-7 have more than compensated for any labour-displacement.

- In addition, employment growth has been faster in those G-7 countries which more intensely use IT technologies.

The same phenomenon holds in key sub-sectors such as wholesale & retail trade, finance, insurance, real estate and business services.

High ICT-using economies experience greater job growth.

Information technology investment intensity and job growth in the services sector



Source: OECD.

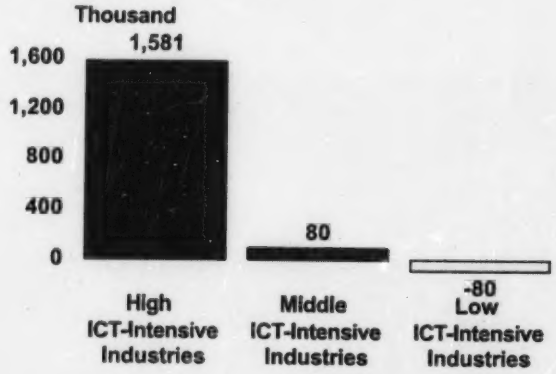
Not only do high ICT-users account for virtually all new jobs...

Over 1.5 million jobs have been created by high ICT-using industries in Canada — generating all net new jobs over the 1986-96 period

- **Low-ICT using industries actually lost jobs.**

The importance of ICT-intensive industries to jobs is true across all Canadian provinces and regions.

Change in employment by ICT intensity in Canada, 1986-1996



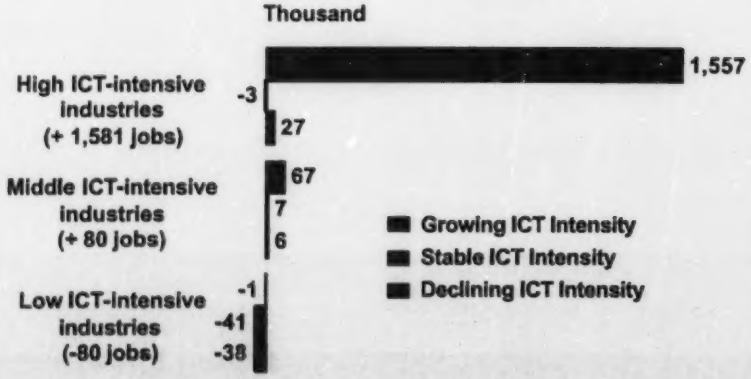
Source: Industry Canada compilations, based on Statistics Canada Data.

...but as ICT-use increases, jobs benefit

Regardless of the current level of industry ICT-use, increasing ICT-use benefits job creation.

Even in the case of the 'middle' and 'low' ICT-intensive industries, those increasing their ICT-use had better employment performance.

Employment change by ICT Intensity 1986-96



Source: Industry Canada compilations based on Statitstics Canada data.

The benefits of increasing ICT-use cuts across industries regardless of current ICT-usage.

How Does Canada Measure Up?

How does Canada compare, internationally?

According to the World Economic Forum (WEF), Canada ranks 1st overall (all countries) in terms of technology potential.

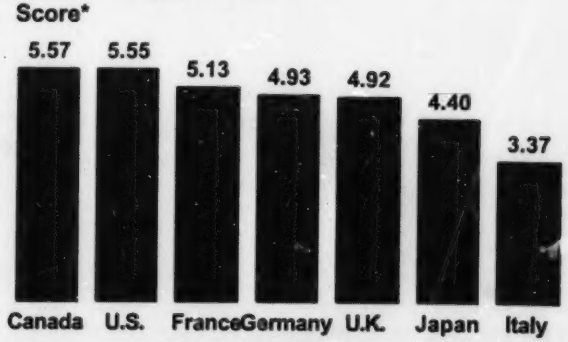
- With relatively high penetration rates in telecommunication, computers and TV, and low user charges, Canadians are quite well-equipped for the rapidly evolving multimedia environment.

In terms of the quality of information technology, the WEF ranks Canada 2nd in the G-7 and 7th among 45 countries.

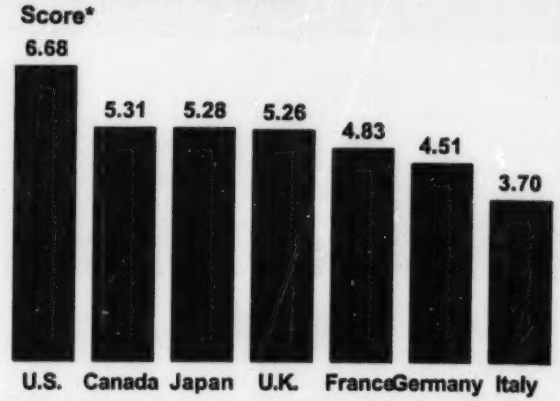
- The U.S. leads all countries in information technology, followed by three Nordic countries (Sweden, Denmark, Finland), Australia and Hong Kong.

Canada is well-positioned for the Information Age!

Ranking of G-7 countries
by technology potential



Ranking of G-7 countries
by information technology



* Scores are based on a combination of hard data and survey responses. Canada's technology potential reflects high secondary school enrollment and the widespread availability of computers.
Source: "The Global Competitiveness Report, 1997", World Economic Forum.

Canada's phone charges are among the lowest in the G-7

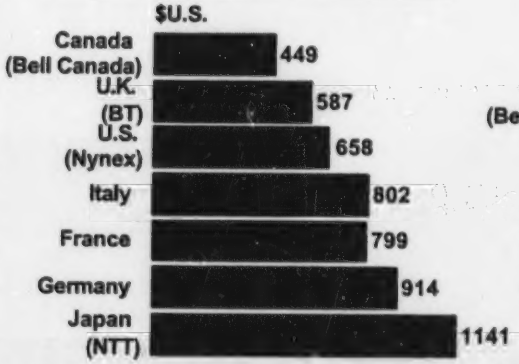
Price is one of the key drivers in stimulating the demand for ICT-use and the speed of ICT adoption.

Canadian residential telephone users face the lowest average annual charges in the G-7, and among the lowest in the OECD.

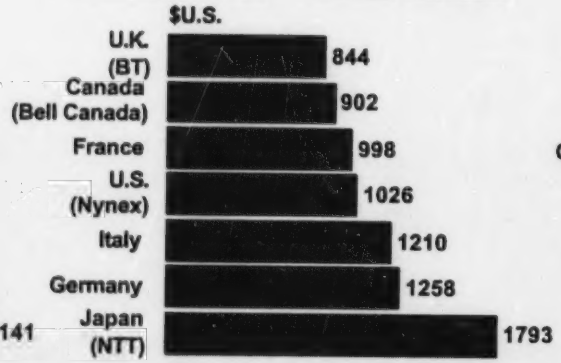
Canadian charges for mobile cellular phones (analogue), is also among the lowest in the G-7.

The Nordic countries (Sweden, Denmark, Finland, and Iceland) have lower telephone and cellular charges than the G-7, roughly between 50% to 70% of the charges in Canada.

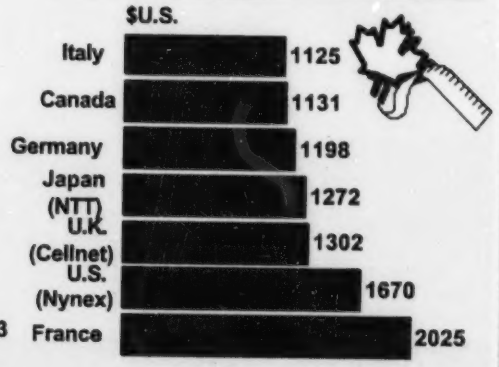
Annual residential telephone charges, January 1996



Annual business telephone charges, January 1996



Annual mobile telephone charges, January 1996



Source: OECD Communications Outlook, 1997.

Canadians enjoy low telephone and cell phone charges!

Canada has the lowest Internet access charges...

Increased competition among Internet Access Providers has lowered access charges dramatically, but price differences between countries remain substantial.

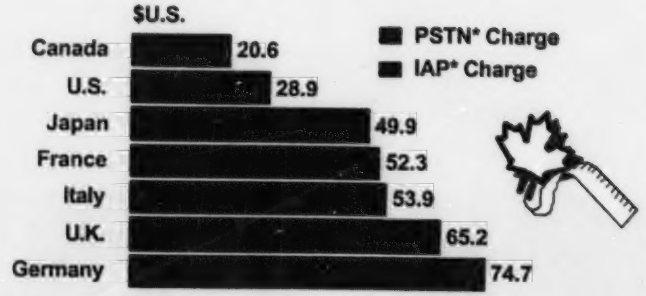
- **Canadian Internet access charges are nearly 30% below U.S. charges, and only a third of the OECD average.**

Canada is 2nd only to the U.S. in the G-7 in Internet host penetration — a very good indicator of the extent to which the Internet is being accessed.

- **Use of English as the primary language of the Internet may have delayed diffusion in countries like Japan, France and Italy.**

Canadian Internet access charges are nearly 30% below U.S. charges.

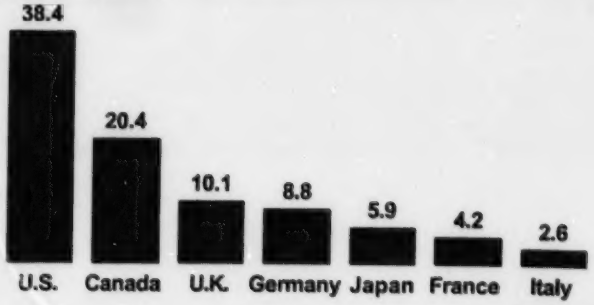
Internet access charges
20 peak hours/month, August, 1996



* Internet Access Provider: Charges include both those levied by the IAP and by the PTO for the use of the Public Switched Telephone Network (PSTN). The PSTN charges include both an element of connection and rental charge as well as usage-based charges, but not long distance charges.

Source: OECD Communications Outlook 1997.

Internet hosts per 1000 inhabitants,
January 1997



Source: OECD Communications Outlook 1997.

...and relatively high penetration rates in computers...

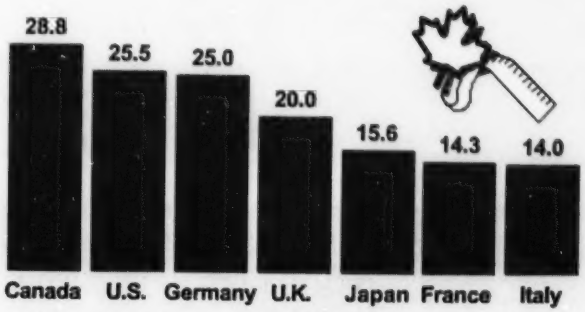
PC and modem penetration in the home is an indication of the ability of consumers to access the on-line environment.

- In 1994, no other country in the G-7 had as high a percent of households with PCs than Canada (28.8%).

- Modem penetration among PC owners is generally very low in the G-7, with the exception of Canada and the U.S.

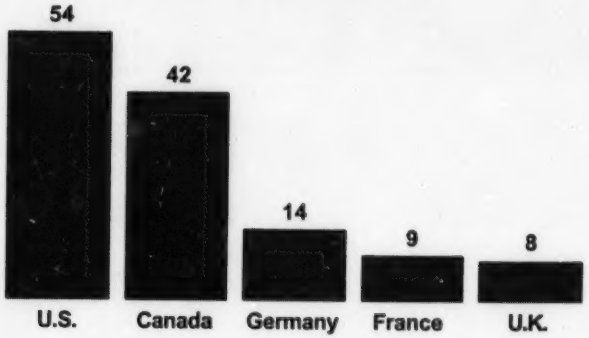
Canada tops the G-7 in terms of the proportion of households with PCs.

Home computer penetration rates:
(% of households with PCs) 1995



Note: For the U.S., PC data is for November 1994.
Source: OECD Information Outlook 1997.

Modem penetration among computer owners:
% of PC households with modems, 1995



Source: Statistics Canada and U.K. Department of Trade & Industry, "Development of the Information Society, An International Analysis, 1996.

...in telecommunications...

Canada has a high tele-density: in 1995, there were 59 main lines per 100 inhabitants in Canada. This is second to the U.S., but higher than for all other countries in the G-7.

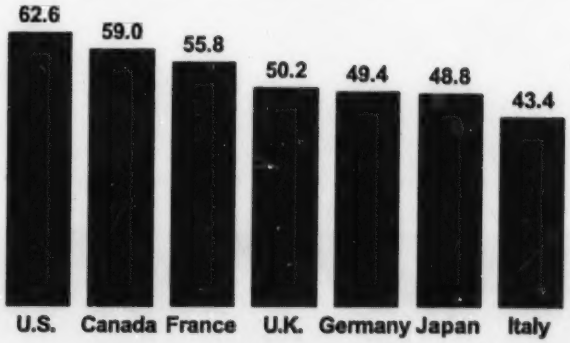
Cellular penetration, an indication of consumers' increased dependency on telecommunications and desire for flexibility in its use, has been increasing across all countries.

- In 1995, cellular subscribers represented nearly 15% of all telecommunication subscribers in Canada (cellular plus telephone mainlines) — a threefold increase since 1990.

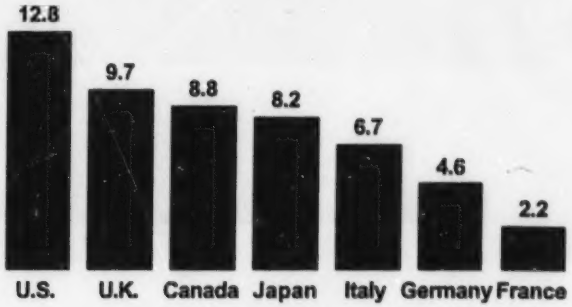
- The Nordic countries have the highest cellular penetration rates in the OECD, with more cellular connections being added than telephone mainlines.

Canada's tele-density is second among G-7 countries.

Telephone mainlines
per 100 inhabitants in the G-7, 1995



Cellular mobile subscribers
per 100 inhabitants in the G-7, 1995



*Source: World Telecommunication Development Report 1996/97.

...and in cable TV

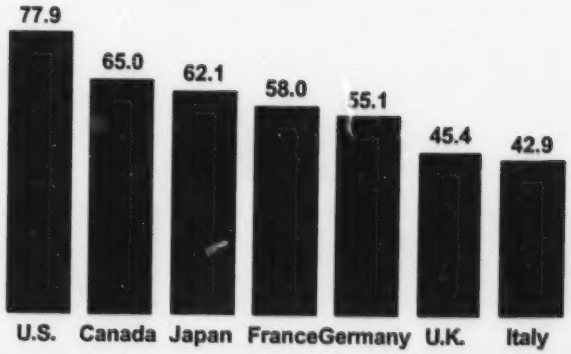
TV has the potential to serve as the home interface to the cybereconomy. New enabling software is being increasingly designed.

Relative to other G-7 countries, Canada and the U.S. have very high cable penetration of TV households, which partly reflects the maturity of the cable market in North America:

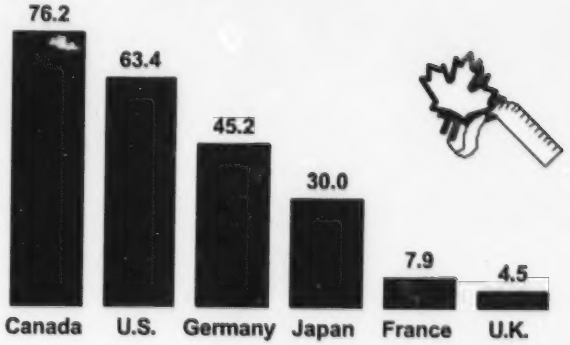
- The low cable TV penetration in France and the U.K. reflects the relatively high satellite penetration in these countries.

Over three-quarters of Canada's TV households in 1994 had cable — the highest in the G-7.

Television receivers
per 100 inhabitants, 1994



Cable TV subscribers
as a % of TV households, 1994



Source: World Telecommunication Development Report, 1995.

A '*Fast Forward*' Look

The world will continue to change quickly...

Digitization is leading to faster change by providing a single-format for information dissemination by all mediums — in other words, creating "convergence".

Communication networks no longer need to carry different information types separately.

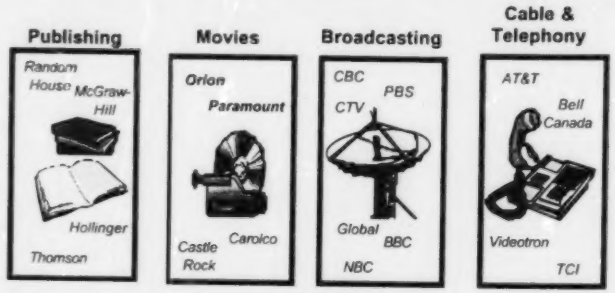
- **Most types of information can be digitized — that is coded in the binary language of ones and zeros.**

Anything digitizable can be sent over the Net:

- **information about products**
- **digitizable products themselves**
- **music, video, software, financial products**

And once on the Net, they become widely accessible.

Information and communication networks traditionally carried different information types...



...digitization allows a common denominator

Source: Industry Canada, adapted from Braxton Associates materials.

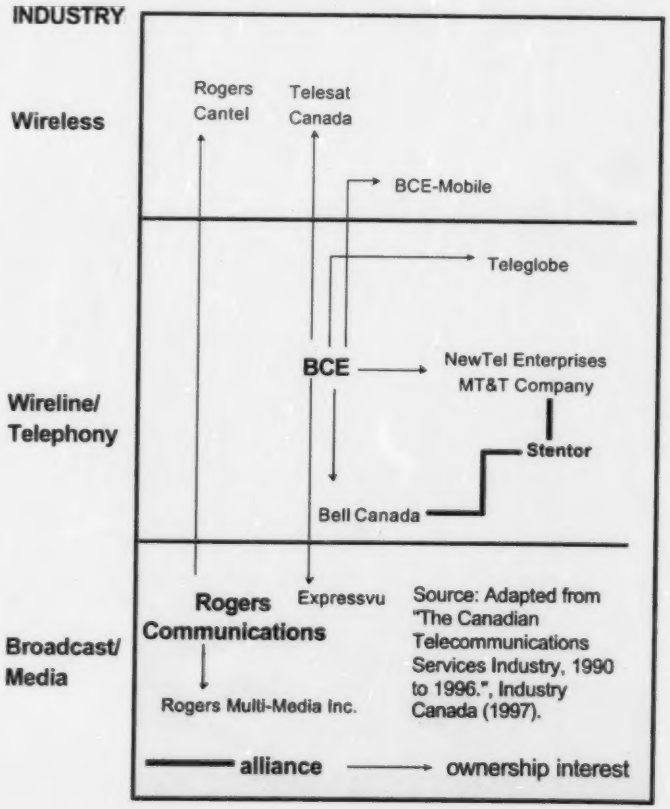
...spurring cross-ownership and alliances among ICT companies...

Intensified competition from greater convergence is driving ownership interests to seek new partnerships.

Bell Canada Enterprises (BCE), Canada's largest telecommunications holding company, in addition to owning Bell Canada, has ownership interests in BCE-Mobile Communications (cellular), Telesat Canada (satellite), Expressvu (multimedia) and Teleglobe Canada.

Convergence is resulting in new partnerships and strategic alliances between telecom, broadcast, media and computer and electronic companies.

Convergence in Canadian telecommunications



Source: Adapted from "The Canadian Telecommunications Services Industry, 1990 to 1996.", Industry Canada (1997).

This is also stimulating regulatory reform

The Telecommunications Act provides for an integrated Canadian market for telecommunication services, with increased reliance on market forces and, where required, efficient and effective regulation.

The Convergence Policy covers three broad subject areas:

- To promote competition in facilities, products and services for the Information Highway
- To encourage interconnection, interoperability, unbundling, resale and sharing
- To foster measures to support the production and exhibition of Canadian content in broadcasting.

Canadian telecommunications policy is conducive to increased competition, network development and innovation.

Telecommunications Policy in Canada

Policy Authority
Industry Canada responsible for telecom policy and spectrum management.

Regulatory Authority
Canadian Radio-television Telecommunications Commission (CRTC) responsible for supervision and regulation of telecommunications and broadcasting.

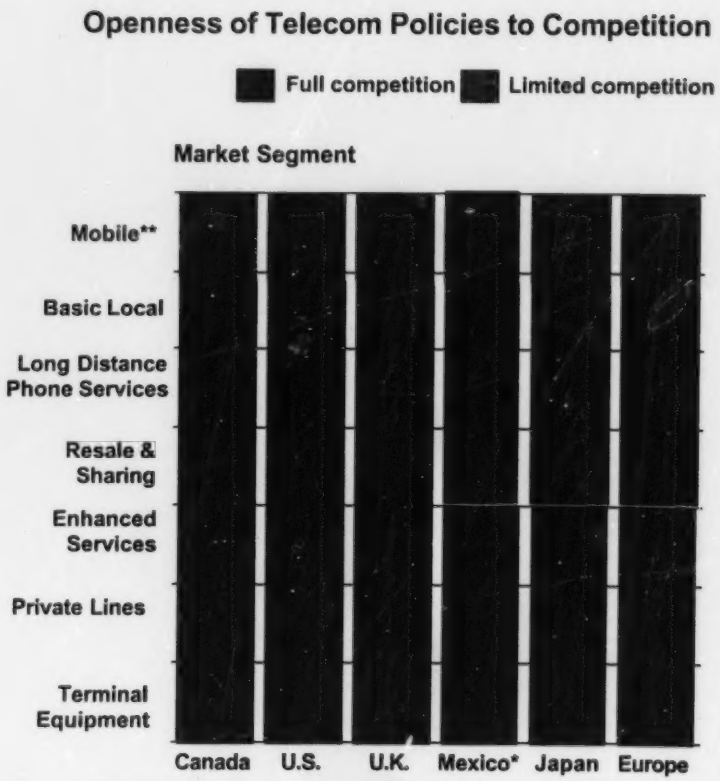
Telecommunications Act (Oct 1993)
New framework for federally regulated Canadian carriers:

Convergence Policy (Aug 1996)
Broad policy objectives and framework for competition between cable-TV companies and telephone companies.

Our policies compare favourably with other nations

Canada is well positioned among countries — as a result of introducing full competition in all market segments.

Canada has an open Telecom industry.



* Mexico has introduced long-distance services competition by non-domestic service providers in 1995.
** Mobile Communications may be a duopoly for cellular services.
Source: OECD Communications Outlook 1997 and Industry Canada.

Q-4

New WTO agreements will accelerate trade...

The two recent WTO landmark agreements on information technologies and basic telecommunication services could considerably accelerate the pace of global trade in ICT goods and services.

Governments from 40 countries, accounting for over 90 percent of world trade in IT products, agreed to phase out all tariffs on various IT products by January 1, 2000.

Free trade in information technologies benefits everyone.

WTO Agreement on Information Technology products

- Tariff reductions in four equal parts (25% each time):
  - 1st July 1, 1997;
  - 2nd January 1, 1998;
  - 3rd January 1, 1999;
  - 4th January 1, 2000.
- Products covered: computers, software, telecom products, telecom equipment, semiconductors, semiconductor manufacturing equipment, software and scientific instruments.

Source: World Trade Organization.

...while relaxing foreign ownership restrictions on services

The new WTO Agreement on Basic Telecom Services will provide Canadian business with important access to key markets.

It will also benefit Canadian consumers — who will enjoy lower prices and enhanced quality service.

Canadian business and consumers will benefit from the new WTO Telecom Agreement.

The WTO Agreement on Basic Telecom Services, February 15, 1997

- **Canadian companies will gain full access to large and dynamic markets in North America, Latin America, Europe and Asia. But:**
  - **Teleglobe Canada's monopoly on overseas traffic will end on October 1, 1998.**
  - **Teleglobe's special ownership restrictions on foreign telecommunication carriers will be eliminated.**
  - **100% foreign ownership and control in the resale sector will be allowed.**
  - **100% foreign ownership and control of international submarine cable landings in Canada will be allowed as of October 1, 1998.**
  - **All restrictions on the use of foreign-owned and controlled global mobile satellites providing services to Canada will be removed as of October 1, 1998.**
  - **Telesat Canada's monopoly on fixed satellite facilities will end by March 1, 2000 and foreign satellites will be allowed to provide services in Canada, other than Direct-To-Home and Direct Broadcasting Services.**
  - **Traffic routing rules for all international services and all satellite services will be removed by March 1, 2000.**

Outlook

The cybereconomy, and its influence in everyday activities, should continue to grow — embracing every aspect of economic life.

This includes at work, in the office, at home, school, and at shopping.

Convergence will also result in more interactive multimedia network exchanges among users — each modifying the information being communicated, thereby quickening the speed and accessibility of all types of information.

As well, businesses and workers will see fast changes in the workplace as the benefits of faster and more accessible information leads to new and better ways of doing things.

It will be easier to use and benefit from information, and activities dependent on the acquisition of knowledge should flourish in the years ahead.

A Cyber Checklist
Fast Growing Activities

- ☑ **Electronic commerce**
  cybershopping, telebanking, electronic billing, call centres, electronic data interchange, tax filing
- ☑ **Computer-based business processes**
  numerically-controlled machines, robots, computer-assisted design & manufacturing, visual and tactile recognition devices
- ☑ **Virtual firms**
  group of networked firms acting as a single organization for purposes of achieving common goals and objectives
- ☑ **Teleworking**
  home teleworking, satellite offices, telecommuting, distance working group
- ☑ **Telemedicine**
  remote diagnostics & monitoring of patients
- ☑ **Remote education**
  tele-education, virtual libraries, interactive exchange between students, teachers & institutions

The challenge of change

As the cybereconomy grows, it will impact powerfully on the way business 'does business'!

- **Business will be able to move faster — but will need to be nimble and quick!**
- **Business will be able to keep in close touch with suppliers — and outsource more! Hastening more niches for small, specialized firms.**
- **Businesses will compete more on the basis of innovation and knowledge — and to simultaneously cooperate and compete with other firms.**
- **Since interactions will be carried out faster, business can "do more business" — rapidly increasing productivity.**
- **The cybereconomy's global nature will spark efforts to extend the WTO Agreements to more countries and harmonize regulatory practices/interconnection frameworks, internationally.**

Key questions:

- **How to ensure sufficient protection for intellectual property related to ICTs, while providing protection of privacy and personal data, and security of information systems?**
- **How to address foreign-ownership barriers in ICT industries, with the needs for Canadian cultural protection?**
- **How to assist especially small business to adapt to new technologies and increased global competition — recognizing their important role as specialized suppliers in a fast-paced and dynamic economy?**

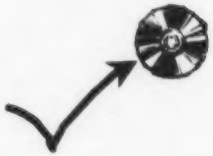
Concluding thoughts...

The information age is here! Creating a cybereconomy that is global — fuelled by the growth of ICTs, and driven by the burgeoning needs of an information-conscious age!

How does Canada measure up? In terms of having a vibrant ICT sector, and relatively high penetration rates in telecommunication, computers and TV, and low user charges, Canada is well-positioned to take advantage of the increasingly prevalent cybereconomy.

In recent years, the ICT sector has been setting the pace for growth, and ICT-intensive industries have been making the most significant contributions to jobs and growth and overall international competitiveness of the economy — points worth noting.

To maximize the potential benefits of the cybereconomy, governments should continue to strive to facilitate competition, infrastructure development and innovation, and assist individuals and business to seize the opportunities associated with the information revolution.



Annex

The ICT sector as defined by 1980 Canadian SIC codes

Sector	SIC		Description
Services	722_		Computer Related Services
		7721	Computer Services
		7722	Computer Equipment Maintenance and Repair
	481_		Broadcasting
		4811	Radio
		4812	Television
		4813	Combined Radio and TV
		4814	Cable Television
	482_		Telecommunication Carriers
	483_		Other Telecom (e.g. paging)
Goods		3341	Record Player, Radio, and Television Receiver Industry
	335_		Communication and Other Electronic Equipment industries
		3351	Telecommunications Equipment Industry
		3352	Electronic Parts and Components Industry
		3359	Other Communication and Electronic Equipment Industries
	336_		Office, Store and Business Machine Industries
		3361	Electronic Computing and Peripheral Equipment Industries
		3362	Electronic, Office, Store and Business Machine Industries
		3369	Other Office, Store and Business Machine Industries
	391_		Scientific and Professional Equipment Industries
		3911	Indicating, Recording and Controlling Instruments Industry
		3912	Other Instruments and Related Products Industry

Any questions or comments?

We welcome your questions, comments and suggestions? You can reach us by ...

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